

CLAIMS

1. A reactive geocomposite article for treating contaminants in soil or water comprising
a pre-formed geotextile mat formed from woven or non-woven fibers, having a thickness of about 6 mm to about 200 mm and having upper and lower major surfaces, wherein the geotextile has void spaces between geotextile fibers that provide sufficient porosity to receive a powdered or granular reactive material throughout its thickness;
a powdered or granular reactive material disposed within the void spaces of the geotextile mat and surrounding the geotextile fibers;
liquid-permeable cover sheets adhered to the upper and lower major surfaces to confine the reactive materials within the geotextile article.
2. The reactive geocomposite article of claim 1, wherein the powdered or granular reactive material is selected from the group consisting of activated carbon, coke breeze, zero-valent iron, apatite, organophilic clay, zeolite, polymeric ion exchange resins, polymeric adsorbing resins and mixtures thereof.
3. The reactive geocomposite article of claim 1, wherein the geotextile fibers are selected from the group consisting of polyolefin, polyester, polyamide, and copolymers of any two or more of the foregoing.
4. The reactive geocomposite article of claim 2, wherein the reactive material is an adsorbent material selected from the group consisting of activated carbon, coke breeze, organophilic clay, and any combination thereof.
5. The reactive geocomposite article of claim 1, wherein the pre-formed geotextile, prior to receiving the powdered or granular reactive material, has an apparent opening size in the range of about 0.5 mm to about 6 mm.
6. The reactive geocomposite article of claim 5, wherein the powdered or granular reactive material has a particle size such that at least 90% of the particles have a size in the range of about 6 mesh to about 325 mesh.

7. The reactive geocomposite article of claim 5, wherein the powdered or granular reactive material comprises about 50% to about 99.9% by volume of the geotextile mat.
8. The reactive geocomposite article of claim 1, wherein the geocomposite article has 30 lb/ft³ to 100 lb/ft³ of powdered or granular reactive material contained therein.
9. The reactive geocomposite article of claim 3, wherein the geotextile fibers are selected from the group consisting of polyethylene fibers, polypropylene fibers, polyester fibers and polyamide fibers.
10. The reactive geocomposite article of claim 1, wherein the pre-formed geotextile mat is non-woven.
11. The reactive geocomposite article of claim 10, wherein the liquid-permeable cover sheets are non-woven textiles.
12. A method of manufacturing a geocomposite article capable of sorbing, reacting with, or neutralizing a liquid-contained contaminant comprising:
 - providing a pre-formed geotextile mat having an apparent opening size in the range of about 0.5 mm to about 6 mm and having opposed major surfaces;
 - contacting one of the major surfaces of the geotextile mat with a powdered or granular material capable of sorbing, reacting with, or neutralizing the liquid-contained contaminant, and causing the powdered or granular material to flow into the pre-formed geotextile mat to fill at least a major portion of the pre-formed geotextile mat within openings of the mat; and
 - adhering a liquid-permeable cover sheet to a major surface of the pre-formed geotextile mat with a water-insoluble adhesive after the mat has received the powdered or granular material.
13. The method of claim 12 further including the step of securing a liquid-permeable cover sheet to a lower major surface of the geotextile mat before filling at least a major portion of the pre-formed geotextile mat with the powdered or granular material.

14. The method of claim 12, further including the step of covering edges of the pre-formed geotextile mat with a sheet material layer.
15. The method of claim 14, wherein the edges of the geotextile mat are covered with excess material from one or both of the cover sheets.
16. The method of claim 15 wherein the excess material of the cover sheets are secured together to cover the edges of the geotextile mat by adhesively securing the cover sheets together over the edges of the geotextile, or heat-sealing the cover sheets together surrounding the edges of the geotextile.
17. The method of claim 12, wherein the powdered or granular material is caused to flow into the geotextile mat by vibrating the geotextile while in contact with the powdered or granular material.
18. The method of claim 12, wherein the powdered or granular material is caused to flow into the geotextile by applying a vacuum to an undersurface of the geotextile to draw the powdered or granular material into the mat from an upper surface.
19. The method of claim 12 further including the step of providing at least one of the cover sheets having a dimension larger than the major surface of the geotextile mat to provide excess cover material so that the excess cover material extends over an edge surface of the geocomposite article, and securing the excess cover material to the geotextile article to cover the edge surface, thereby reducing or eliminating escape of powdered or granular material through the covered edge surface of the geotextile article.

20. The method of claim 19, including the step of covering all edge surfaces with excess cover material, and securing the excess cover material to the geocomposite article thereby reducing or eliminating escape of powdered or granular material through all edge surfaces of the geotextile article.

21. The method of claim 19, wherein the cover sheet is secured over the edge surface by an expedient selected from the group consisting of adhesively securing, needlepunching and ultrasonic welding.

22. The method of claim 20, wherein at least one of the cover sheets is secured over all edge surfaces by an expedient selected from the group consisting of adhesively securing, needlepunching and ultrasonic welding.

23. A method of manufacturing a multi-layer geocomposite article having a geotextile layer filled with a powdered or granular material adhered to an adjacent geotextile mat containing no added powdered or granular material comprising:

providing a pre-formed geotextile mat having an apparent opening size in the range of about 0.5 mm to about 6 mm and having opposed major surfaces;

contacting one of the major surfaces of the geotextile mat with a powdered or granular material capable of sorbing, reacting with, or neutralizing a liquid-contained contaminant, and causing the powdered or granular material to flow into the pre-formed geotextile mat to fill at least a major portion of void spaces in the pre-formed geotextile mat;

adhering liquid-permeable cover sheets to the opposed major surfaces of the pre-formed geotextile mat after the mat has received the powdered or granular material, to form an at least partially filled first geotextile layer; and

adhering a second pre-formed geotextile mat to the filled first geotextile layer.

24. The method of claim 23, wherein the second geotextile mat has an apparent opening site in the range of about 0.5mm to about 6mm, and is at least partially filled with powdered or granular material after adhering the second geotextile mat to the at least partially filled first geotextile layer.

25. The method of claim 24, wherein the second geotextile mat is unfilled.

26. The method of claim 24, further including the step of adhering a liquid-permeable cover sheet to an exposed major surface of the second geotextile mat.

27. The method of claim 25, further including the step of adhering a liquid-permeable cover sheet to an exposed major surface of the second geotextile mat.

28. The method of claim 24, further comprising the step of adhering a third pre-formed geotextile mat to an exposed cover sheet of the second geotextile mat.

29. The method of claim 28, further including the steps of at least partially filling the third pre-formed geotextile mat, having an apparent opening size in the range of about 0.5mm to about 6mm, with powdered or granular material, and securing a liquid-permeable cover sheet to an exposed major surface of the third pre-formed geotextile mat to form a geocomposite article having powdered or granular material in the major, outer surfaces of the article, and having an unfilled core formed by the second geotextile mat.